



**MINNESOTA DEPARTMENT OF PUBLIC SAFETY**  
**State Fire Marshal Division**  
**INTERPRETATION**

Interpretation #: INTERP FP-10 (2007)	Subject of Interpretation: Definition of the term "member" as used in wood attic construction.		
Reviewed and Approved By: Jerry Rosendahl	Title: State Fire Marshal	Effective Date: July 10, 2007	Revision: July 10, 2007

**Code document:** NFPA 13 (2002 Edition) – Section 8.6.4.1.4, Section 11.2.3.1.8(12) and Table 8.6.2.2.1(a).

**NFPA 13(02) 8.6.4.1.4** Sprinklers Under a Roof or Ceiling in Combustible Concealed Spaces of Wood Joist or Wood Truss Construction with Members 3 ft or Less on Center and a Slope Having a Pitch of Four in 12 or Greater.

**NFPA 13(02) 11.2.3.1.8(12)** *For all occupancies consisting of combustible wood joist or wood truss construction with members spaced less than 3 ft on center used with slopes with a pitch at or exceeding 4 in 12 (4/12) using standard spray sprinklers, sprinklers shall be quick response having pressures in accordance with the requirements of Table 8.6.2.2.1(a).*

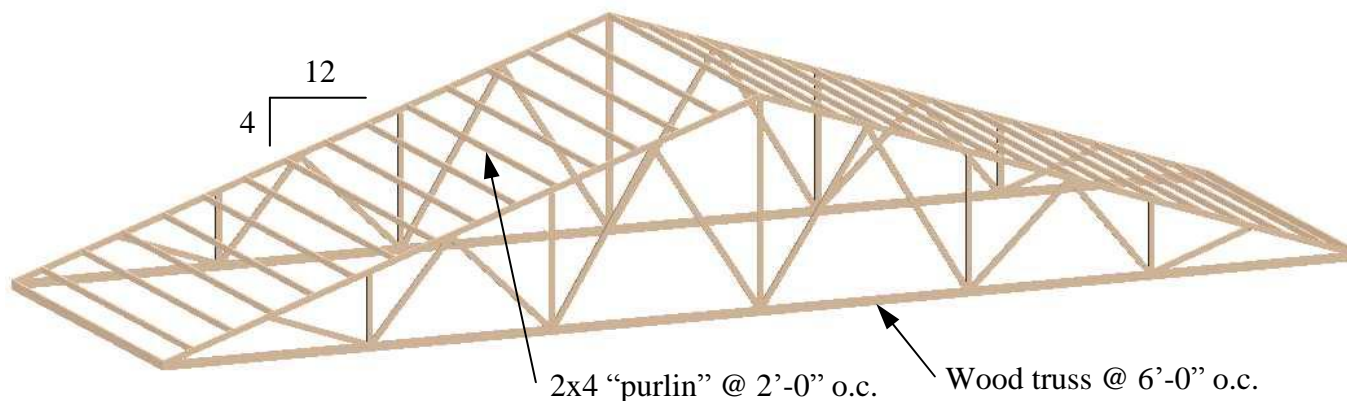
**NFPA 13(02) 8.6.2.2.1** *The maximum allowable protection area of coverage for a sprinkler (As) shall be in accordance with the value indicated in Table 8.6.2.2.1(a) through Table 8.6.2.2.1(d).*

**Table 8.6.2.2.1(a) Protection Areas and Maximum Spacing (Standard Spray Upright/Standard Spray Pendent) for Light Hazard**

Construction Type	System Type	Protection Area		Spacing (maximum)	
		ft <sup>2</sup>	m <sup>2</sup>	ft	m
Noncombustible obstructed and unobstructed and combustible unobstructed with members 3 ft or more on center	Pipe schedule	200	18.6	15	4.6
Noncombustible obstructed and unobstructed and combustible unobstructed with members 3 ft or more on center	Hydraulically calculated	225	20.9	15	4.6
Combustible obstructed with members 3 ft or more on center	All	168	15.6	15	4.6
Combustible obstructed or unobstructed with members less than 3 ft on center	All	130	12.1	15	4.6
Unoccupied attics having combustible wood joist or wood truss construction with members less than 3 ft on center with slopes having a pitch of 4 in 12 or greater	All	120	11.1	8* × 15 (minimum psi) 10* × 12 (minimum 20 psi)	2.4* × 4.6 (minimum 0.48 bar) 3* × 3.7 (minimum 1.34 bar)

\*The smaller dimension shall be measured perpendicular to the slope.

**Circumstances:** A concealed attic space with a sloped roof with a pitch of 4 in 12 or greater. The wood truss members are spaced 6 feet on center. Running perpendicular to the trusses are wood 2x4 “purlins” spaced 2’-0” on-center. The 2x4’s may be located directly on top of the wood trusses or may be framed into the sides of the top chords of the wood trusses (see Figure 1).



**Figure 1**

**Question:** Does the term “member” refer only to major structural elements (the wood trusses), or does it refer to any element such as the “purlins”?

**Answer:** The term “member” as used in these sections refers to any permanently attached element that is part of the roof structure. A “member” can be structural or non-structural. In Figure 1 above, the wood trusses and the 2x4 “purlins” are members.

**Rationale:** Discussions with the National Fire Protection Association (NFPA), the American Fire Sprinkler Association (AFSA), and the National Fire Sprinkler Association (NFSA) resulted in varying opinions. The three organizations did agree that this issue is not clearly defined by NFPA 13 and that the full scale tests for attic spaces only used wood joists spaced 2’-0” on-center with plywood decking (smooth) and did not address this specific or similar configurations.

Reasons sloped ceilings are treated differently stem from the big impact on how the heat travels. As a result of the heat being channeled up and away from the fire, sprinklers well outside the typical remote area will activate. Also, the nearest sprinklers that are adjacent to the fire do not activate for an extended period of time. As such, the special spacing rules were developed to get the sprinklers closer together so that they would be closer to the fire as it raced up the slope. A line of sprinklers is also now required within 12 in. of the peak. The intent of these new requirements is to optimize operation time and performance by attacking the fire as quickly as possible. Our concern is for the extent of impact the member has to drive the ceiling jet up the slope. The “purlins” may reduce the upward movement of the ceiling jet but this type of construction was not considered or discussed by the NFPA 13 committee, nor were full scale tests with perpendicular members conducted.

In summary, the new design requirements in NFPA 13 (2002 edition) were added to improve the performance and effectiveness of sprinklers in attics with sloped roofs. Testing has proven that a steeply pitched roof has a strong effect on the activation of sprinklers. The most effective sprinkler protection is provided when the new design requirements are applied to construction with perpendicular members.

It is not the SFMD’s position to retroactively cause the removal of this type of installation previously installed by contractors and approved by state or local AHJs acting in good faith.